Broadening the scope of regulation: a prerequisite for a positive contribution of transgenic crop use to sustainable development

Michel Fok

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Broadening the scope of regulation: a prerequisite for a positive contribution of transgenic crop use to sustainable development

To many observers, it may sound provocative to say that transgenic crop use could contribute positively to sustainable development. After large-scale adoption of glyphosate-tolerant varieties, ecosystems have been seriously disturbed by the emergence of weeds with resistance to glyphosate herbicide (Owen, 2008). Yet, more than ten million producers in developing countries are already involved in using transgenic varieties (James, 2008), while many more are turning to them (Burkina Faso in 2009). If we skip round the issue raised here, it would be like admitting that millions of producers are working against sustainability and that nothing can be done to improve the current situation.

We address here the need to broaden the scope of regulation with a view to ensuring more positive impacts from transgenic crop use, well beyond the current concern of biosecurity and the distance separating transgenic and non-transgenic plots. Our position is based on an analysis of impacts after about 15 years of GMO use, with special emphasis on alterations to ecosystems, on the status of variety and seed markets, on profitability trends, and on observations of producer cultivation practices. The originality of our approach lies in dealing with regulation from an ex-post approach, through the observation of emphasized phenomena in countries having adopted transgenic varieties of cotton and soybean on a large scale (namely USA, China, India, Brazil, and South Africa).

The effects of transgenic crop use on ecosystems were not properly anticipated although, of course, the emergence of weeds with resistance to glyphosate herbicide manifests one of the threats feared by the opponents of GMO. This phenomenon is reported in most countries where RoundUp Ready® varieties from Monsanto are marketed, but not necessarily as seriously as in a few cotton states of the USA (Foreman and Glasgow, 2008) where up to 18 weed species are reported to be glyphosate-resistant. However, herbicide resistance is the single negative environmental impact whose materialization has proved to be indubitable. There is not enough evidence of anticipated pest resistance to Bt toxins, whether or not specific measures (namely "refuge plots") are taken to prevent the occurrence of pest resistance. In contrast, the shift of pest complex was not clearly anticipated, but it has now occurred in China (Wang, et al., 2008), but also in the USA so that previously secondary pests need to be chemically controlled and could threaten the continuation of cotton production (Robinson, 2003).

Similarly to the use of any new technology, the global effects of transgenic varieties mainly depend on how safely they are used. That is how transgenic varieties could positively contribute to sustainable agricultural development. Indeed, a few effects observed when using transgenic varieties could be regarded as positive from economic and environmental perspectives. The use of Bt cotton has led to the virtual elimination of target pests (Wu, et al., 2008), to the point of no longer requiring specific chemical control.

Although the monopolistic position of Monsanto has raised fears of abusive prices for transgenic seeds, we believe that the most harmful effect of this position pertains to the alteration of weed and pest ecosystems. As pointed out above, weed resistance to herbicide has occurred more quickly and surely than pest resistance. A major reason is the absence of any precautions to prevent weed resistance, as opposed to the "refuge strategy" against pest resistance. This shortfall is, at the very least, amazing since only a single herbicide-tolerant gene was introduced at the same time in various crops.

The regulation process must take the shift of ecosystem complexes into account. More precisely, regulation must prevent the risk of quick ecosystem shifts when a new type of transgenic variety is disseminated through a single set of gene(s) by a single biotech firm. Various modalities can be considered to prevent the occurrence of the said risk. For example, when a new type of transgenic variety is commercially released and when no alternative transgenic varieties of similar type are available, an excessive level of area coverage should be prohibited.

Private coordination could compensate for the failure of narrow public regulation to ensure sustainable use of transgenic varieties, but it would not necessarily last without public intervention. In Parana state (Brazil), in 2007, RoundUp Ready® soybean varieties covered only 43% of the soybean area because 45% of producers only devoted these varieties to plots with high weed infestation levels (Fok, et al.,

2009). These producers demonstrated a strategy of managing the use of transgenic varieties in connection with weed pressure. This sound management is nevertheless threatened by insufficient attention of the government to issues related to seeds. Like any country having adopted transgenic varieties, Brazil does not pay attention to ensuring the GM-free quality of the seeds of conventional varieties. Its regulation scheme overlooks the modalities of royalty collection which penalize producers who have involuntarily used GM-contaminated conventional seeds (Mendez del Vilar, et al., 2007). These modalities discouraged producers from continuing to use conventional varieties. Finally, the supply of conventional seeds is also subject to the decision of input providers, on whom many producers depend, whereas those providers may be linked to biotech companies.

Regulation of the use of transgenic varieties should stop overlooking the issue of seeds. To our knowledge, there is no adjustment of the seed production and control schemes in all countries that have commercially released transgenic varieties. Producers have also suffered from a lack of clarification about the preservation of rights related to farmers' seeds. This right might be flouted in countries that are affiliated to the UPOV Convention of 1978, as in Brazil.

More precisely, regulation of the economic conditions in using transgenic seeds should prevent excessive prices, which undermine producers' profitability. The high level of transgenic seed prices has been reported (Hofs, et al., 2006), whether or not seed markets lack competition (Xu and Fok, 2010). Regulation of the price of transgenic seeds could be justified by some abusive pricing practices, as demonstrated by the yearly adjustment of transgenic seed prices in relation to the prices of the agricultural commodities involved (notably in Brazil, and as is likely in Burkina Faso, after one year of Bt cotton release).

Public commitment is needed in regulating the use of transgenic seeds, by covering more areas than currently. State strength and awareness are required to fulfil its regulatory role. In 2006, India showed the way by forcing Monsanto to agree to halve the price of Bt cotton seeds. In 2007, China also started to control excessive competition on the market for these seeds. These examples could inspire other countries in regulating prices. However, so far, there has yet to be any demonstration of regulation governed by concerns for the sound management of biotic systems.

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